National Measurement Office Certification

UK/0126/0182

MI-006

# EC type-examination certificate UK/0126/0182

Issued by:

**The National Measurement Office**
**Notified Body Number 0126**

In accordance with the requirements of the Measuring Instruments (Automatic Catchweighers) Regulations 2006 (SI 2006/1257) and the Measuring Instruments (Non-Prescribed Instruments) Regulations 2006 (SO 2006/1270) which implement, in the United Kingdom, Council Directive 2004/22/EC, this EC type-examination certificate has been issued to:

**Krickl Waagen Systeme GmbH**
**Heid-Werkstr. 13**
**A-2000 Stockerau**
**Austria**

In respect of a vehicle-mounted automatic catchweighing instrument designated the KWS DYWA1 and having the following characteristics:

| | | | |
|---|---|---|---|
| Maximum capacity | Max | ≤ | 500 kg |
| Minimum capacity | Min | ≥ | 5 kg |
| Scale interval | e | ≥ | 0.5 kg |
| Accuracy class | Y(b) | | |

The necessary data (principal characteristics, alterations, securing, functioning etc) for identification purposes and conditions (when applicable) are set out in the descriptive annex to this certificate.

**Issue Date:** **20 November 2014**
**Valid Until:** **19 November 2024**
**Reference No:** **TS0101/0036**

**Signatory:** **G Stones**
**for** **Chief Executive**

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UKAS PRODUCT CERTIFICATION 0135

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# Descriptive Annex

## 1 INTRODUCTION

The instrument, designated the KWS DYWA1, is a battery-operated automatic catchweighing instrument consisting of load cells, electronic equipment and position sensors mounted at the rear, side or front of a bin collection vehicle. The instrument automatically determines the weight of the loaded bin during the lifting process, then the weight of the empty bin on the way down to determine the net weight of refuse emptied. The instrument is designed to weigh dynamically. In addition, the bin may be identified by an RFID tag reader system. The data is displayed on an indicator mounted near the operating console.

Each lifting “chair” at the back of the vehicle is fitted with one load cell, the outputs are used by the instrument (using dual channel configuration) to determine the weight of individual bins (2 wheeled bins, left and right hand sides) or large bins (4 wheeled bins), the weights for each channel being added to obtain the total weight.

## 2 FUNCTIONAL DESCRIPTION

### 2.1 Mechanical

Figure 1 shows a typical installation, with Figure 2 showing the block diagram for the instrument.

#### **2.1.1** Load cell

The instrument comprises one (small bin) or two (large bin) load cell(s) type HK685 (manufactured by Krickl Waagen Systeme GmbH, as described in certificate R60/2000-GB1-14.04), maximum capacity 1000 kg, mounted on the lifter (Figure 3).

#### **2.1.2** Inclinometer

The instrument comprises an inclinometer type ADXL325 or ADXL327, manufactured by Analogue Devices and mounted near the lifter. The sensor acts as a switch and prevents weighing above the maximum tilt angle. The maximum tilt angle shall be determined at initial verification and protected as part of the legally relevant parameters, and shall not exceed 8 degrees.

#### **2.1.3** Position sensor

A position sensor type IFS209, manufactured by Pepperl & Fuchs, is mounted on the lifter. Its output is used to determine the weighing window within which the dynamic weight is calculated. Optional truck-embedded proximity sensors may be used.

### 2.2 Electrical

**2.2.1** The pattern operates from 9-32 V DC, supplied from the 12 or 24 V DC vehicle battery. The indicator console is fitted with a non-volatile static RAM with Lithium battery to maintain the basic functions such as clock, etc

#### **2.2.2** PCB/CPU/ADC

The load cell output is digitized by the AD converter type CS5532 24 bit manufactured by Cirrus Logic.

**2.2.3** Weighing module

The weigh module is housed in a die cast IP66 sealed enclosure. Calibration setting, transaction record and configuration settings are stored on a solid state flash memory. Communication is via CAN messaging. Figure 9 shows the weighing module.

**2.2.4** I/O Control module

The I/O control module is housed in a die cast IP66 sealed enclosure. Digital input / output signals from the vehicle are processed and communication is via CAN messaging. Figure 4 shows the I/O control module.

**2.2.5** Indicator

The KT3500 weight indicator displays weight data, current lifter status, total weights, RFID tag numbers and fault diagnosis. Communication is via CAN messaging. Figure 5 shows the indicator.

**2.2.6** RFID Control module / Tag readers

The RFID control module is housed in a die cast IP66 sealed enclosure. The unit can power up to 2 separate RFID antennas. RFID tag information is decoded and transmitted via CAN messaging. Figure 6 shows the RFID antenna and Figure 7 shows the RFID control module.

## 2.3 Devices and interlocks

**2.3.1** The instrument is provided with a semi-automatic zero setting, the range of zero is +/- 2% Max.

**2.3.2** The calculation of net weights are determined by the difference between the rising “full” bin and falling “empty” bin hence any errors due to a drift of zero cannot affect the net result, provided the drift remains in an acceptable range. This is achieved by checking the real time mV output of the load cell while a bin is not on the lifter. If the drift remains outside the pre-set limit of +/- 2% Max from the zero point over consecutive samples for 5 seconds, a flag will be set and weighing shall be prevented. If the output drifts back into range the flag will be cleared and weighing resumed.

**2.3.3** Data storage

The measurement data is automatically stored in an internal SD card located in the sealed weighing module, and can be retrieved via the communication ports. The following data is recorded:

- Weigh module serial number
- Incremental transaction number
- Data of transaction
- Time of transaction
- NET weight of transaction and unit of measurement
- RFID tag number (if used)
- Lifter used (left, right or trade – with trade used to designate large bins)

**2.3.4** The indicator runs through a standard check at power up, defects shall be obvious to the user, and displayed as error messages.

**2.3.5** The following interlocks prevent the weighing process:

- Real time clock not running
- Storage card not responding
- Load cell output error

## 2.4 Operation

- A bin is placed on the lifter
- The lifter raises the bin
- The RFID tag is read when present
- Lifter reached weighing position
- 'UP' weight is calculated
- Bin contents is emptied into the vehicle
- Lifter then lowers to weighing position
- 'DOWN' weight is calculated
- Resultant NET weight is calculated, displayed and recorded
- Bin is removed
- Sequence complete

# 3 TECHNICAL DATA

**3.1** The system has the following technical characteristics:

| | Small bin | Large bin |
|---|---|---|
| Maximum capacity (Max): | ≤ 150 kg | ≤ 500 kg |
| Scale interval (e =): | ≥ 0.5 kg | ≥ 2 kg |
| Minimum capacity (Min): | ≥ 5 kg | ≥ 10 kg |
| Operation | Dynamic | |
| Climatic environment | -20°C to +50 °C | |
| | KT3500 indicator: Non-condensing (closed)<br>KT3500 indicator in IP66 enclosure and other parts: Condensing (open) | |
| Electromagnetic environment | E3 | |
| Power supply | 9-32 VDC (via 12 or 24 V vehicle battery) | |
| Accuracy class | Y(b) | |
| Cable length (load cell to indicator): | 5 m | |

## 3.2 Documentation and drawings

| | |
|---|---|
| Manual ver 2.8 | User manual |
| GA 04298 issue 2 | Mounting arrangement |
| GA 04247 issue 4 | System schematics |
| RFID_issue_4.0 | RFID board PCB layout |
| WEIGH_issue_7.0 | Weigh board PCB Layout |
| INTERFACE_issue_5.0 | Control I/O board PCB layout |
| rfid4.sch | RFID board Circuit diagram |
| weigh7.sch | WEIGH board Circuit diagram |
| io5.sch | Control I/O board Circuit diagram |

## 3.3 Software

### 3.3.1 Verification information

On power up, the LED pixels on the KT3500 display are inverted to confirm operation. The display shows the software firmware version. The weighing module version (3.xx, with xx reflecting minor, non-legally relevant modifications), last calibration date and incremental calibration number are then displayed on the screen before the system reverts to normal weighing mode.

### 3.3.2 Security

The source code is compiled and downloaded into the micro controller. The device is then protected to prevent removal or modification of the software code.

Calibration is accessed via a password protected parameter. When a calibration is carried out, the date and incremental calibration number is recorded to solid state flash memory. The solid state flash memory is sealed within the weighing module. On power up, the date and sequential calibration number is displayed on the screen prior to system operation.

# 4 PERIPHERAL DEVICES AND INTERFACES

## 4.1 Interfaces

The instrument may have the following interfaces:

- 6-wire load cell connection
- RS232
- CAN bus communication.

## 4.2 Peripheral devices

The instrument may be connected to any peripheral device that has been issued with an evaluation certificate or parts certificate by a Notified Body responsible for Annex B (MI-006) under Directive 2004/22/EC in any Member State and bears the CE marking of conformity to the relevant directives; or

A peripheral device without a test certificate may be connected under the following conditions:

- it bears the CE marking for conformity to the EMC Directive;
- it is not capable of transmitting any data or instruction into the weighing instrument, other than to release a printout, checking for correct data transmission or validation;
- it prints weighing results and other data as received from the weighing instrument without any modification or further processing; and
- it complies with the applicable requirements of Paragraph 8.1 of Annex I.

## 5 APPROVAL CONDITIONS

The certificate is issued subject to the following conditions:

### 5.1 Legends and inscriptions

**5.1.1** The following legends are durably and legibly marked on a label (Figure 8) fixed on the control enclosure so that it is visible to the user (Figure 9):

'CE' marking
Supplementary metrology marking
Notified Body verification mark
Accuracy class
Serial number
Manufacturers mark or name
Certificate number
Max
Min
e=

**5.1.2** All components are identified by individual serial numbers.

## 6 LOCATION OF SEALS AND VERIFICATION MARKS

**6.1** The CE mark shall be impossible to remove without damaging it. The labels shall be impossible to remove without them being destroyed.

The markings and inscriptions shall fulfil the requirements of Paragraph 9 of Annex I of the Directive 2004/22/EC.

**6.2** Access to the configuration and calibration facility is via the password protection on the KT3500 display.

**6.3** Every time the configuration or calibration is modified, the calibration number counter is incremented (see 3.3.2) and shall to be recorded on the instrument on a descriptive label near the rating plate. The label shall be impossible to remove without being destroyed.

**6.4** Components that may not be dismantled or adjusted by the user will be secured by common serial numbers, a wire and seal or tamper evident label and securing mark.

The securing mark may be either:

- a mark of the manufacturer and/or manufacturer's representative, or
- an official mark of a verification officer.

## 7 ALTERNATIVES

**7.1** Having the instrument fitted with modified RFID and Weigh circuit boards, with the associated drawings listed in section 3.2 as follows:

| | |
|---|---|
| RFID_issue_5.0 | RFID board PCB layout |
| WEIGH_issue_9.0 | Weigh board PCB layout |
| Rfid5.sch | RFID board circuit diagram |
| Weigh9.sch | Weigh board circuit diagram |

## 8 ILLUSTRATIONS

Figure 1 Typical installation
Figure 2 Block Diagram
Figure 3 Load cell mounted on the lifter
Figure 4 Control and I/O boards in enclosure
Figure 5 Indicator near operating console
Figure 6 RFID antenna at rear of vehicle
Figure 7 RFID control box at rear of vehicle
Figure 8 Rating plate example
Figure 9 Labelled weigh control enclosure (Example)

## 9 Guidance for verification

The following tests may be conducted on a fully installed instrument. Each test must be conducted on a small bin, then on a large bin.

The test loads (calibrated weights or product with reference weight measured on a suitable control instrument) may remain in the bin for the duration of the tests (weights/product not tipped after each lift), with the exception of the Minimum weight test.

### 9.1 Weighing performance

Accuracy of weight readings at a minimum of 5 increasing loads, including:

- Empty bin (up and down weight readings)
- 50e (up weight reading only)
- 200e when applicable (up weight reading only)
- Max (up weight reading only)

### 9.2 Tilting

Accuracy of weight readings at the following loads (10 lifts at each load):

- Near Min (up and down weight readings)
- Near Max, subject to safety considerations (up weight reading only)

Test to be conducted with the vehicle in the following positions:

- Reference (level)
- Longitudinally forward tilt (subject to safety considerations, ≤ 8 deg)
- Longitudinally backward tilt (subject to safety considerations, ≤ 8 deg)
- Transversally right tilt (subject to safety considerations, ≤ 8 deg)
- Transversally left tilt (subject to safety considerations, ≤ 8 deg)
- Reference (level)

The resulting maximum tilt angle shall be determined accordingly and set as a software parameter as described in section 2.1.2.

### 9.3 Eccentricity

Accuracy of weight readings (up weight reading only) at 1/3 Max (10 lifts), with the load placed on the right-hand side of the bin, then on the left-hand side.

### 9.4 Minimum weight

Accuracy of Net weight (up-down weight readings) for loads equal to Min placed in the bin and tipped (10 lifts).

## CERTIFICATE HISTORY

| ISSUE NO. | DATE | DESCRIPTION |
|---|---|---|
| UK/0126/0182 | 20 November 2014 | Type examination certificate first issued. |
| - | - | No revisions have been issued. |

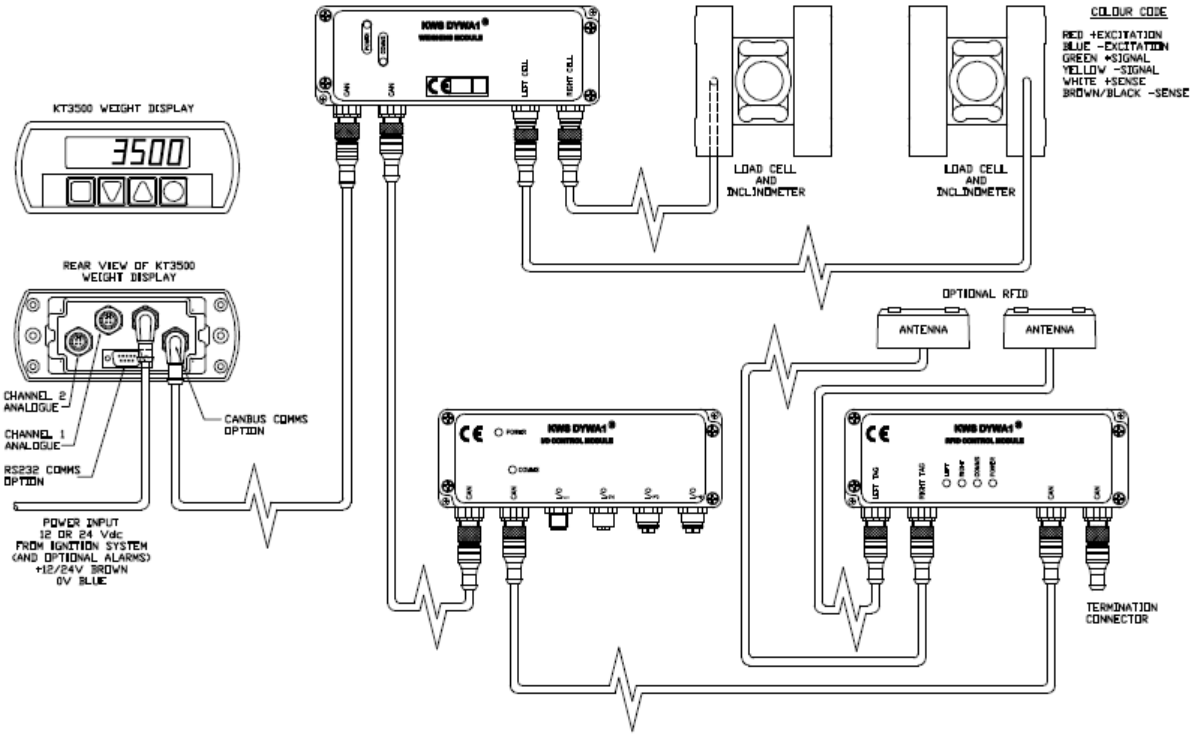


**Figure 1 Typical installation**

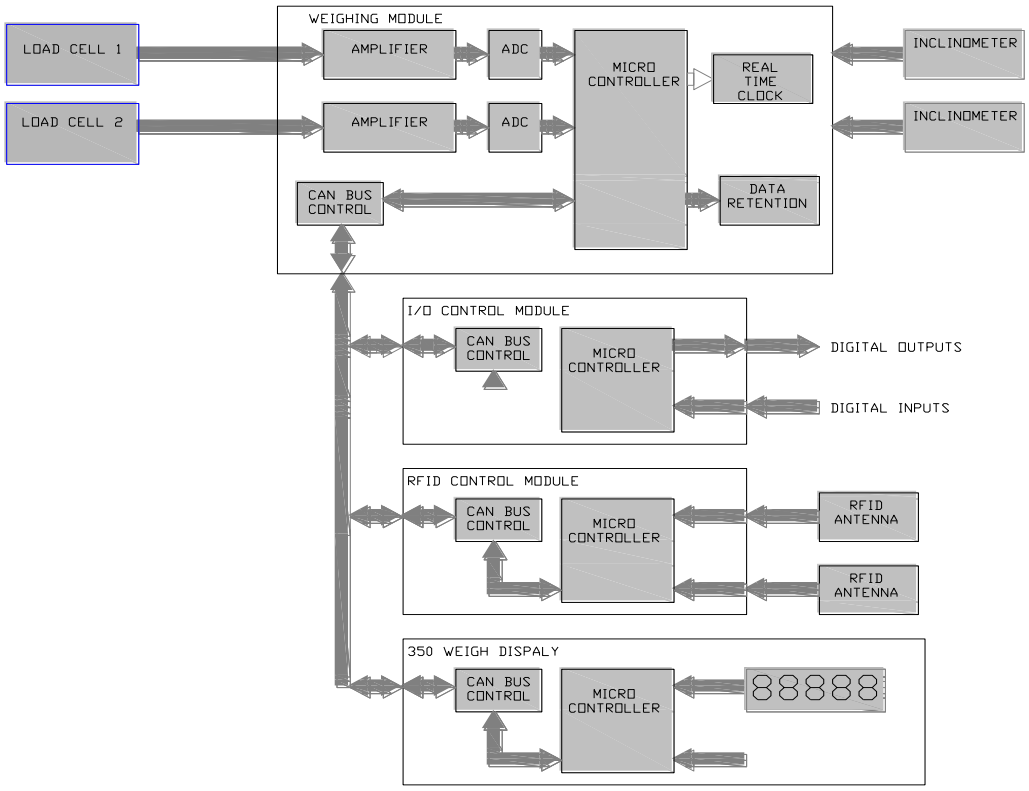


**Figure 2 Block diagram**

**Figure 3 Load cell mounted on lifter**

**Figure 4 Control and I/O boards in enclosure**

**Figure 5 Indicator near operating console**

**Figure 6 RFID antenna at rear of vehicle**

**Figure 7 RFID control box at rear of vehicle**

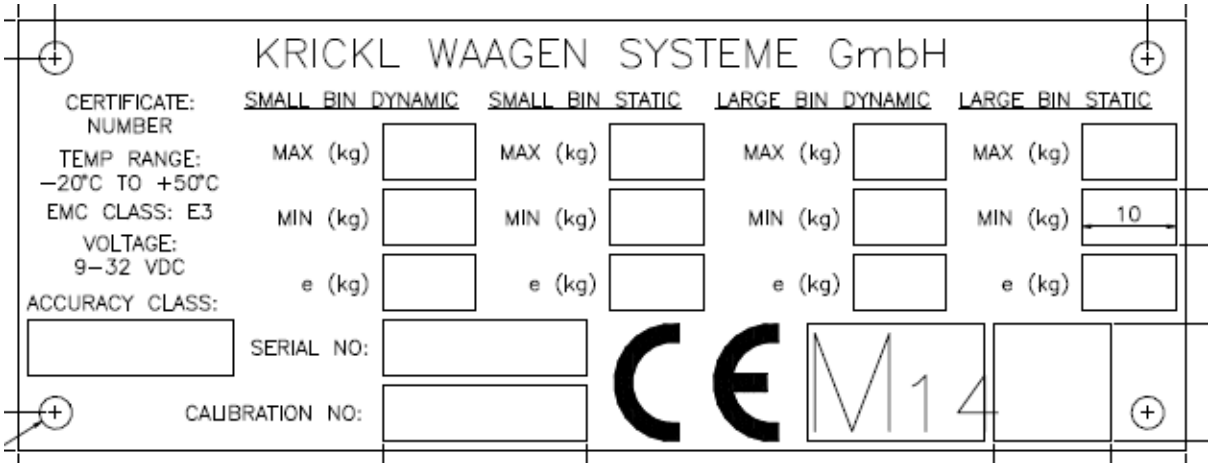


**Figure 8 Rating plate example**

**Figure 9 Labelled weigh control enclosure (Example)**

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